PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.:	10/810,983
Filing Date:	March 26, 2004
Applicant:	Yar-Ming Wang et al.
Group Art Unit:	1795
Examiner:	Kishor Mayekar
Title:	Surface-cleaning to Remove Metal and Other Contaminants Using Hydrogen
Attorney Docket:	GP-304670 (8540R-85)

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APPEAL BRIEF UNDER 37 CFR § 41.37

This is an appeal from the Office Action mailed June 30, 2009 (herein the "Final Action") and the subsequent Advisory Action mailed September 18, 2009, for which a Notice of Appeal was filed on November 19, 2009. This brief is timely filed on January 19, 2010.

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B. Rather than providing a reason for arriving at Appellants' claimed method, the combined references teach away from using a current density of less than one A/dm^2 to clean adhered metal particle matter from a conductive surface even for caustic, highly alkaline cleaning solutions; thus, there would be no expectation of success whatever in modifying such processes to use non-aggressive acid or base as an electrolyte medium in conjunction with a current density of less than one A/dm^2 to remove adhered metal particle matter 6

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Real Party in Interest

The real party in interest in the present application are GM Global Technology Operations, Inc. An assignment from the inventors to General Motors Corporation was recorded with the U.S. Patent and Trademark Office March 26, 2004 at reel 015159, frame 0893. An assignment from General Motors Corporation to GM Global Technology Operations, Inc. was recorded with the U.S. Patent and Trademark Office June 14, 2009 at Reel 022102, Frame 0533.

Related Appeals and Interferences

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of the Claims

Claims 1-4, 6-9, 11-18, and 20 are currently pending and stand rejected. Claims 5, 10, 19, and 21-29 are cancelled. This appeal is taken as to all of the rejected claims, claims 1-4, 6-9, 11-18, and 20.

Status of Amendments

No claims were amended after the final rejection..

Summary of Claimed Subject Matter

Claim 1 is an independent claim. The remaining claims are dependent on claim 1 or ultimately dependent on claim 1 through one or more intermediate claims.

A. Independent claim 1

Claim 1 claims a method of separating adhered metal particle matter from a surface of a conductive vehicle or vehicle part substrate that has adhered metal particle matter using hydrogen generated by water electrolysis, then coating the cleaned vehicle or part. Para. [0003]; Fig. 1.

In the method, the vehicle or vehicle part substrate surface **22** having adhered metal particle matter is immersed in an electrolyte medium **17** comprising a non-aggressive acid or base. Paras. [0011], [0015], [0020]; Fig. 2. Gaseous hydrogen is produced by electrolyzing water of the electrolyte medium in contact with the surface, with the vehicle or vehicle part substrate being a cathode in the electrolytic cell, dislodging said adhered metal particle matter by force of said evolved hydrogen to clean the surface. Paras. [0013]-[0014]; Fig. 2. The water is electrolyzed at a current density of less than one amp per square decimeter (A/dm^2). Original claim 19 on p. 10; para. [0022], at top of p. 7. The dislodged metal particle matter is transported from a vicinity of the surface, and a coating is applied to the cleaned surface. Paras. [0016], [0020]; Fig. 2 (eductor system **14**).

The process is effective for removing metal contaminants trapped on the surface and inside crevices, para. [0011], overcoming defects in the painted finish, paras. [0010], [0017]. [0023].

B. Separately rejected dependent claims

Claim 3 is separately rejected. Claim 3 is directed to the method of claim 1, wherein the dislodged matter is transported from a vicinity of said surface by flow of electrolyte via an eductor. Para [0020]; Fig. 2 (eductor system **14**).

Claim 18 is separately rejected. Claim 18 is directed to the method of claim 1, wherein the electrolyte medium comprises trisodium phosphate. Para. [0022] on p. 6.

Grounds of Rejection to be Reviewed on Appeal

Claims 1, 2, 4, 6-9, 11-17, and 20 stand rejected as unpatentable over Hoffman, Jr. et al, U.S. Patent No. 6,264,823 in view of Zaki, "Electrocleaning," and Polan et al., U.S. Patent No. 4,568,431.

Claim 3 stands rejected as unpatentable over Hoffman, Jr. et al, U.S. Patent No. 6,264,823 in view of Zaki, "Electrocleaning," and Polan et al., U.S. Patent No. 4,568,431 and further in view of Lauke, U.S. Patent No. 4,568,438.

Claim 18 stands rejected as unpatentable over Hoffman, Jr. et al, U.S. Patent No. 6,264,823 in view of Zaki, "Electrocleaning," and Polan et al., U.S. Patent No. 4,568,431 and further in view of Ogihara et al., U.S. Patent No. 4,03,592.

Arguments

I. Claims 1, 2, 4, 6-9, 11-17, and 20 are patentable because the combination of the Hoffman, Jr., Zaki, and Polan references fails to provide a reason to use a current density of less than one A/dm^2 with a non-aggressive acid or base electrolyte medium, but instead teaches away from using such conditions together.

A. Proposed Findings of Fact

1. The Hoffman, Jr. patent teaches "the range of amps which may be supplied is preferably about 1 amp per gallon of cleaning solution to about 20 amps per gallon of cleaning solution." Col. 7, ll. 18-25.

2. In Example 1, the Hoffman, Jr. patent teaches cleaning "shredded or whole used aluminum cans" with "80 to 95 amps" to remove lacquer paint and printing inks. Col. 14, ll. 27-39.

3. The Hoffman, Jr. patent teaches that "larger bodies such as transformer cases, shopping carts, extruded and sheet steel, boilers and the like" are cleaned by an electrolyte spray method instead of being immersed in a bath. Col. 4, ll.9-25. At the same time, in the Hoffman, Jr. patent examples 3 and 13 an "electrolyte bath [] prepared as in Example 1" was used where the "electrodes and the power supply were connected and activated as in Example 1."

4. The Zaki article teaches that, depending on the type of steel, for a highly alkaline steel cleaner steel substrates require 3 to 10 amps per square decimeter. P. 136, Table I; section "Operating Parameters and Process Considerations, ll. 11-13 of the section ("Adequate recommended current density ranges for different basis metals are summarized in Table I. Values below these produce light to marginal electrocleaning."); p. 137, Table II (showing alkalinity by type of metal) & lines 3-4 of section "Electrocleaner Formulation."

5. The Zaki article teaches that with cathodic electrocleaning there is a "risk of plate out of charged impurities from the solution on the cathodic surface" that "leads to poor adhesion on

plating." P. 135, section "Cathodic Electrocleaning," lines 8 to 11 of first paragraph of the section.

6. The Zaki article teaches that surface area being cleaned "controls current density and, for a given rectifier setting, will directly affect he cleaning efficiency." P. 136, section "Operating Parameters and Process Considerations, ll. 9-10 of the section.

7. The Polan patent teaches a highly alkaline electrolyte solution. Col. 5, lines 2-35 (see especially lines 18-27).

8. The Polan patent teaches, for its highly alkaline electrolyte solution, a current density of 1 to 500 mA/cm^2, which equals (1000 mA per A, 10 cm per dm or 100 cm^2 per dm^2) 0.1 to 50 A/dm^2, col. 5, ll. 60-61, to remove residual grease and oil from its metal foil, col., 4, l. 68; col. 5, ll. 3-10.

9. Polan teaches that for removing residual grease and oil with its caustic solution, the preferred current is 2.5 to 20 A/dm^2 (25 to 200 mA/cm^2), col. 5, ll. 61-62.

10. The Ogihara patent teaches that a current density of 300 to 1000 ampere/m^2 (at 100 square decimeters per square meter, 3 to 10 A/dm^2) is needed for cleaning grease and oil from a metal. Col. 6, ll. 55-56.

B. Rather than providing a reason for arriving at Appellants' claimed method, the combined references teach away from using a current density of less than one A/dm^2 to clean adhered metal particle matter from a conductive surface even for caustic, highly alkaline cleaning solutions; thus, there would be no expectation of success whatever in modifying such processes to use non-aggressive acid or base as an electrolyte medium in conjunction with a current density of less than one A/dm^2 to remove adhered metal particle matter.

The present claims are patentable over the combined references because the combined references do not teach the claimed method in which the electrolyzing is at a current density of less than one amp per square decimeter in a non-aggressive acid or base electrolyte medium. Rather than suggest Applicants' method, the combined references teach away from it by disclosing that a much higher current density is required.

"A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." Ricoh Co., Ltd. v. Quanta Computer Inc., 550 F.3d 1325, 1332 (Fed. Cir. 2008) (quoting In re Kahn, 441 F.3d 977, 990 (Fed. Cir. 2006)); In re ICON Health & Fitness, Inc., 496 F.3d 1374, 1382 (Fed. Cir. 2007) ("[A] reference teaches away from a combination when using it in that combination would produce an inoperative result."); *see also* KSR International Co. v. Teleflex Inc., 550 U.S. 398, 416 (2007) (explaining that in U.S. v. Adams, 383 U.S. 39 (1966), the Court "relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious" in finding the invention patentable).

As in Ricoh and as in Adams, the cited art teaches away from Applicants' process in which a current density of less than one amp per square decimeter is used to clean a surface in a non-aggressive electrolyte medium. The Hoffman, Jr. patent teaches "the range of amps which may be

supplied is preferably about 1 amp per gallon of cleaning solution to about 20 amps per gallon of cleaning solution." Col. 7, ll. 18-25. For a tank large enough to hold a car body, which may be 30,000 to 50,000 gallons, this would be enormous amperage, even given a fairly large article such as a car body. Applicants point out, though, that this teaching in the Hoffman, Jr. patent has units (amps per volume cleaning solution) inconsistent with the secondary references (amps per unit area). At most, this reference has no reliable teaching as to current for electrocleaning in a non-aggressive electrolyte medium.

The Zaki article teaches that steel substrates require, for its highly alkaline steel cleaners (p. 137, ll. 9-10), 3 to 10 amps per square decimeter, depending on the type of steel. This is three time or more higher than the maximum current in Applicant's method. Because the Zaki article urges that "[v]alues below these produce light to marginal electrocleaning," and because the Zaki values are for aggressive, highly alkaline cleaners, the person skilled in the art would be firmly led away from attempting much, much lower currents with much, much less aggressive electrolyte solutions.

The Polan patent, like the Zaki article, teaches a highly alkaline electrolyte solution, col. 5, lines 2-35, and current (1 to 500 mA/cm^2, which equals (1000 mA per A, 10 cm per dm or 100 cm^2 per dm^2) 0.1 to 50 A/dm^2) that encompasses the area Zaki calls marginal cleaning to well beyond, into the area Zaki warns leads to etching and surface roughness. Polan, however, is only trying to remove residual grease and oil from its metal foil, col. 4, ll. 60-61; col., 4, l. 68; col. 5, ll. 3-10. Even for removing residual grease and oil the preferred current is 2.5 to 20 A/dm^2 (25 to 200 mA/cm^2), col. 5, ll. 61-62, which is much higher than in Applicants' method for removing adhered metal particle matter.

The Ogihara patent, cited in rejection of claim 18, is further evidence that the art taught away from Appellants invention. The Ogihara patent teaches that a current density of 300 to 1000 ampere/m^2 is needed for cleaning grease and oil from a metal. Col. 6, ll. 55-56.

Taken together, Applicants believe a fair reading would be that the combined references teach electrocleaning would be ineffectual in a non-aggressive electrolyte medium if the current density is less than about 3 A/dm^2. Certainly, one could not expect such conditions to separate adhered metal particle matter from a substrate, even if low current densities might be appropriate in highly caustic mediums for removing Polan's residual grease and oil. The Office Action argues "proper adjustment of a known effective variable," but in view of the teaching this variable would have been adjusted up, not down. The art teaches away from adjusting current in the way Applicants have done.

For these reasons, Applicant believes the rejection of the claims as unpatentable over Hoffman, Jr. et al, U.S. Patent No. 6,264,823 in view of Zaki, "Electrocleaning," and Polan et al., U.S. Patent No. 4,568,431. and should be reversed.

II. Claim 3

Claim 3 is patentable over the cited combination of references for the same reasons given in Section I for the patentability of underlying claim 1. The Lauke patent is cited as teaching an eductor. The Lauke patent does not, however, overcome the evidence of teaching away, hence nonobviousness, of the other references of the combination. Nor does the Lauke patent in any way account for the deficiencies of the other references or itself provide any reason for making the combination of non-aggressive electrolyte and low current density for removing adhered

metal particle matter from a vehicle prior to applying a coating to the cleaned surface. Therefore, claim 3 is patentable over the cited references.

For these reasons, Applicant believes the rejection of claim 3 as unpatentable over Hoffman, Jr. et al, U.S. Patent No. 6,264,823 in view of Zaki, "Electrocleaning," and Polan et al., U.S. Patent No. 4,568,431 and further in view of Lauke, U.S. Patent No. 4,568,438 should be reversed.

III. Claim 18

Rejection Under 35 U.S.C. § 103(a) over Hoffman, Jr. et al. in View of Zaki and Polan et al. and Further in View of Ogihara et al.

Claim 3 is patentable over the cited combination of references for the same reasons given in Section I for the patentability of underlying claim 1. As discussed in Section I, the Ogihara patent merely reinforces the teaching away of the other references, providing no expectation of success for the method Appellants claim. The Ogihara patent, which concerns cleaning grease and oil from a metal, col. 5, ll. 20-30 & col. 6, ll. 13-19, is cited as teaching the particular cleaning solution of this claim. The Ogihara patent does not, however, explain or overcome the remaining references' teachings away from Applicants' method. In fact, it reinforces the teaching away by stating, that a current density of 300 to 1000 ampere/m^2 is used, col. 6, ll. 55-56. Nor is the Ogihara patent enlightening on methods for removing adhered metal particle matter.

Therefore, in view of the deficiencies of the rejection, Applicant asks the Board to reverse the rejection.

Conclusion

Accordingly, Applicant respectfully requests that the Board reverse all of the rejections of claims 1-4, 6-9, 11-18, and 20.

Should communication by telephone be needed or helpful, the undersigned can be reached at (248) 641-1220 (direct line).

Respectfully submitted,

Dated: January 19, 2010

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Claims Appendix

1. A method of separating adhered metal particle matter from a surface of a conductive vehicle or vehicle part substrate comprising:

immersing the vehicle or vehicle part substrate surface having adhered metal particle matter in an electrolyte medium comprising a non-aggressive acid or base;

producing gaseous hydrogen by electrolyzing water of the electrolyte medium in contact with said surface of said vehicle or vehicle part substrate, dislodging said adhered metal particle matter by force of said evolved hydrogen to clean said surface, wherein said electrolyzing is at a current density of less than one amp per square decimeter (A/dm^2) and wherein said conductive substrate constitutes a cathode;

transporting said dislodged metal particle matter from a vicinity of said surface; and

applying a coating to said cleaned surface.

2. The method of Claim 1, wherein said electrolyzing is conducted at a voltage greater than the electrolysis voltage of water.

3. The method of Claim 1, wherein said dislodged matter is transported from a vicinity of said surface by flow of electrolyte via an eductor.

4. The method of Claim 1, wherein said transporting of dislodged metal particle matter is conducted by the electrolyte medium, which entrains said dislodged metal particle matter.

6. The method of Claim 4, wherein said transporting comprises movement of at least one of said surface and said electrolyte medium relative to one another.

7. The method of Claim 6, wherein said electrolyte medium moves.

8. The method of Claim 6, wherein said substrate moves.

9. The method of Claim 4, wherein said electrolyte medium has a density sufficient to entrain said dislodged metal particle matter.

11. The method of Claim 2, wherein the voltage is at least 2 volts.

12. The method of Claim 2, wherein voltage is at least 5 volts.

13. The method of Claim 2, wherein the voltage is up to about 20 volts.

14. The method of Claim 1, wherein the electrolyte medium comprises a basic electrolyte.

15. The method of Claim 1, wherein the electrolyte medium comprises an acidic electrolyte.

16. The method of Claim 1, wherein the electrolyte medium comprises sodium carbonate in an amount of about 20 to about 30 grams per liter of electrolyte medium.

17. (The method of Claim 1, wherein the pH of the electrolyte medium is in a range of about 3 to 13.

18. The method of Claim 1, wherein the electrolyte medium comprises trisodium phosphate.

20. The method of Claim 1, wherein said current density is in a range of about 0.1 to about 0.3 A/dm^2.

Evidence Appendix

None

Related Proceedings Appendix

None